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RADIATION EFFECTS ON SILICON SOLAR CELLS

Sixth Monthly Progress Report Covering the Period
July 1 - 31, 1962

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This sixth monthly report on contract No. NAS7-91, Radiation Effects on Silicon Solar Cells, covers the period July 1 - 31, 1962. During this period experiments utilizing galvanomagnetic measurements and infrared absorption on irradiated silicon have continued and further data analysis has been performed on the previous carrier-lifetime experimental results. The electron spin resonance equipment is also nearing completion.

Six floating-zone n-type Si samples were irradiated at 30 Mev. Two were 15 Ω cm As-doped samples, two were 10 Ω cm P-doped samples, one was a 0.5 Ω cm As-doped sample and one was a 0.4 Ω cm P-doped sample. There were no significant differences between the P- and As-doped materials in either their irradiation or annealing behavior. The carrier removal rates were ~1 cm^{-1} for the higher resistivity material and ~0.54 cm^{-1} for the low resistivity samples.

The cryostat and cavity for ESR measurements have now been completed and a diagram is shown in Fig. 1. A central rod holds the sample and emerges from a vacuum seal. This allows the sample to be rotated for ESR measurements and to be moved vertically into three positions. The lowest is for irradiation at liquid hydrogen temperatures, if desired. The dewar here has windows of 0.001 in. thick stainless steel. The middle position contains the ESR cavity constructed of glass with a baked silver-paint inner coating. The upper position has an oven which can be used for in situ sample annealing.

The semi-automatic data analysis system which will be used for the lifetime of the irradiations is also nearing completion and it is expected that it will be used to reduce most of the lifetime data during the forthcoming reporting period.

Plans for future work include a continuation of work to measure the introduction rate and pertinent cross sections of the A and E center in pulled and floating-zone refined silicon crystals.

The following personnel participated in this research program during this month: D. M. J. Compton, S. K. Boehm, R. Denson, H. Guerena, J. W. Harrity, H. Horiye, S. Kurnick, V. A. J. van Lint, E. G. Wikner, and M. E. Wyatt.

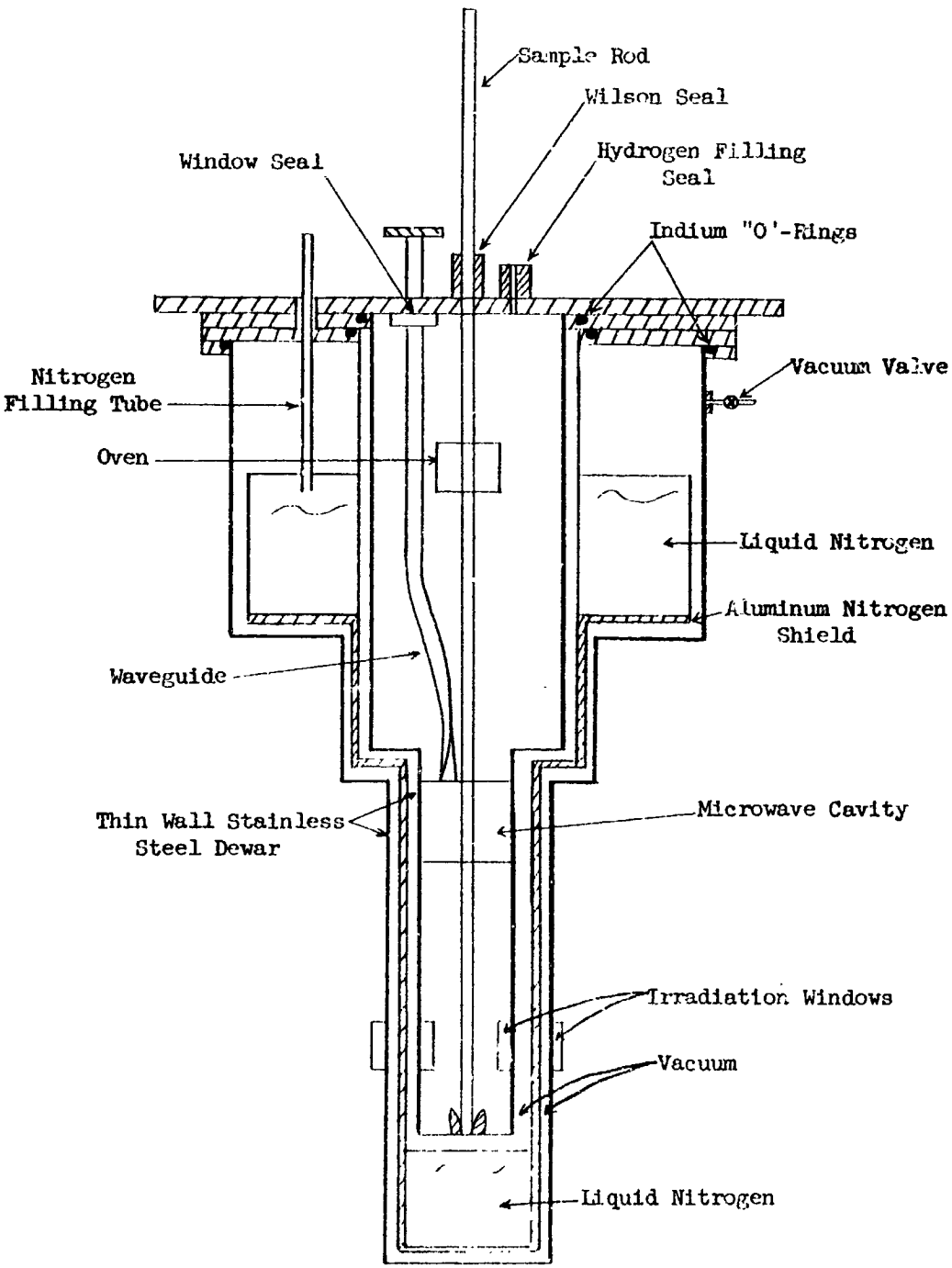

Fig. 1--The ESR cryostat.